

ISRAEL TRAINS FIRST BLIND IBM
OPERATORS

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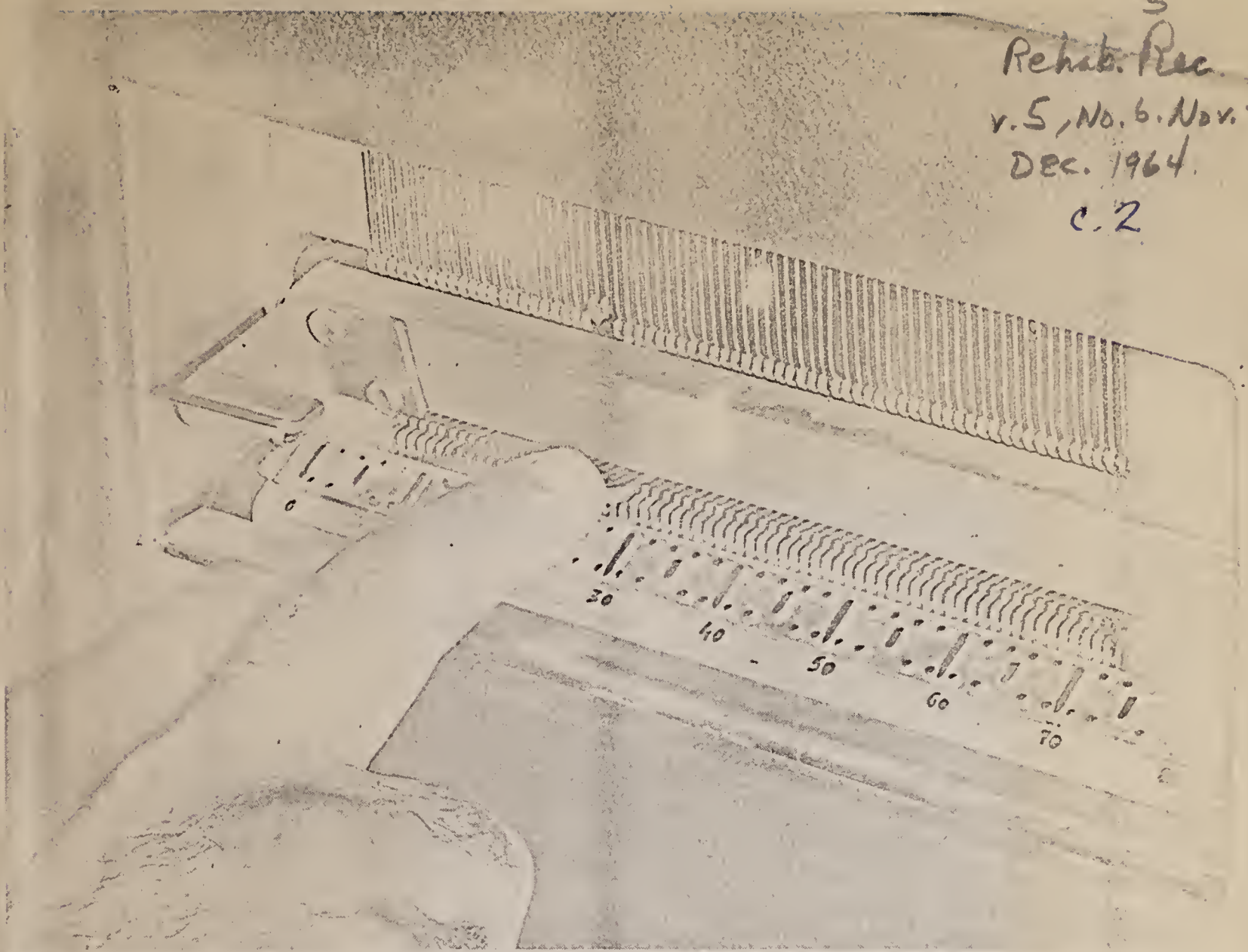
Yehuda Schiff and Ezra Shapir

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Braille ruler inserted in unit window helps blind operator find errors that stop reproducing machine.

Israel Trains First Blind IBM Operators

YEHUDA SCHIFF
and **EZRA SHAPIR**

The eight blind persons who have completed special training in the operation of IBM machines here in Jerusalem are now employed and are performing satisfactorily beside sighted IBM operators in Israeli government departments and private business enterprises.

Their success and the good progress of nine persons enrolled in the second course in this pioneering project suggest that well qualified blind persons everywhere may soon find employment in the rapidly expanding field of data processing and computer programs.

Mr. SCHIFF is program director and Mr. SHAPIR is technical engineer for the research work described here.

The Jerusalem experiment is one of 60 projects in 9 countries abroad which the Vocational Rehabilitation Administration is supporting as part of its international rehabilitation research program. Israel's Ministry of Social Welfare conducts the IBM trainee program in cooperation with the Office Mechanization Center of the Ministry of Finance, the IBM World Trade Corporation, and the Jewish Institute for the Blind.

The project came about because of the need to make productive use of the capabilities of the many well educated young blind persons who are continuing to come to Israel from many other countries.

The nine present trainees were born in seven countries—Morocco, Iraq, Rumania, Turkey, Yemen, Germany, and Israel—and are of varying ages, cultures, and levels of education, although qualifying tests show them all to have good aptitude for the work of the project.



One product of this research will be a manual for instructors on how to teach blind people the theory and practice of operating IBM machines and of panel wiring. It will include detailed illustrations and explanations of the devices which have been developed in the project to compensate for the visual handicaps of the trainees.

At the beginning of the project, a survey showed that Israeli government offices were equipped only with conventional IBM machines. It must be borne in mind that for a relatively long time conventional machines will continue to be used in medium sized concerns, and therefore we have at the first stage to train the blind to operate this equipment. At the same time we should see to it that the most advanced and skillful of our students are further trained to operate and program electronic computers and thus keep abreast of new developments in this field.

We began by developing training methods suitable for conventional equipment, specifically:

- Card punch 011
- Printing card punch 026
- Card verifier 056
- Card sorter 082, 083
- Card collator 077, 088
- Accounting machine 407
- Reproducing punch 519
- Interpreter 557
- Calculating punch 602

The trainees are first taught the function of the IBM machines and how the desired information can be obtained from them. This part of the course also includes training in the wiring of control panels of all the machines. In the second part of the course they practice the actual operation of the machines.

Studies are conducted according to a special program tailored to the needs of the visually handicapped trainees. The lessons are based on manuals published by IBM for sighted people. These manuals were transcribed in braille in order to free the trainee from dependence on instructions from sighted friends. Most of the explanations and the analyses in the manuals are in the form of drawings of the machines or their parts and illustrations and exercises based on sketches and drafts.

As far as abstract explanations are concerned, the blind do not present special problems, but when explanations are based on drawings or illustrations, difficulties arise. The sketches and drafts are rendered in our training manuals with braille ink through a braille heater, so that the blind trainees can feel the sketches.

It was found necessary to prepare special aids to enable the trainees to understand each part and its function. They can touch and finger the machine and in this way learn its dimensions, the various switches which operate it, and the methods of its operation. They cannot, however, touch the internal parts and accessories which cause the machine to operate. In short, it is very hard to make clear to them how the machine functions.

Even in the case of the simplest type of machine, which works without control panels (the sorter), it is difficult to explain to the trainee how the cards fall into the various pockets and what is the internal construction of the machine which makes this possible. The trainee gets a clear picture of the principles and the process of sorting, however, with the aid of a model made of wood. On it were fixed original chute blades from the IBM sorter, with movable keys and hammers which enable the trainee to grasp the action of the magnets. The trainee runs a card through the model, presses one of the keys which move the hammers, and follows the progression of the cards in the machine with his hands. In this way he learns the action of the magnets and the function of the chute blades in the machines.

To make clear the internal construction of the machines and the various card feed units in them, we designed other models so that the trainee could feel the differences between the various units and their functions. Similarly, tactile models are used to explain how to wire control panels. We also developed three-dimensional models to teach the principle of the IBM comparing unit and to make clear the mechanism of the IBM selector.



Blind trainee wires control panel, following braille instructions.



While explaining the parts of the machines we usually try to confine ourselves to original IBM parts. For this purpose IBM has supplied parts which are no longer in use, and these have been fitted for training purposes.

Illustrated are two of the instruments which we developed to enable the blind operator to check his work himself. One is a device for checking cards which are being sorted. This instrument is fixed on the upper cover of the sorter and causes no inconvenience. The other has solved the particularly complicated problem of reading a punched card.

A blind man with even the most highly developed sense of touch cannot feel the column and the line of the punch, as the distance between the columns is only about 2 millimeters. However, an operator must be able to read a card and know exactly where the punch is.

The instrument shown on page 6, which we developed and built, was planned on the basis of standard parts of IBM machines. It works on the principle of touch. There are 12 star wheels under a cover which is perforated like a fully punched IBM card (960 punches). The card is placed between the star wheels and the cover so that the blind operator can feel those wheels which project through the punches in the card. He reads the line and the column with the help of special braille rulers and can check one column after the other by turning a knob.

These instruments and others have proved extremely useful so far to the blind in actual work, but they are still in the development stage. We are rather uncertain regarding the instrument for reading a card, and an electric instrument for this

purpose is now being developed as well. Both experimentation and training are being carried out intensively.

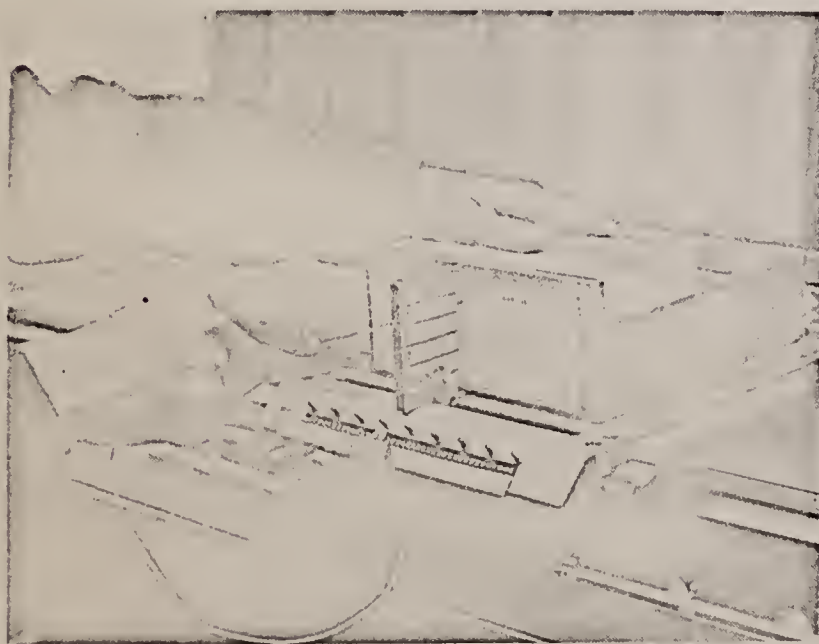
Our experience has shown that proper training of the blind in this work demands individual explanations and instruction, in theoretical studies as well as in actual operation of the machines. We therefore divided the trainees into two groups. While one group is being taught the theoretical material, the other practices operation of the machines.

Training in actual operation begins with simple projects, specially prepared for the purpose, with a training card. In this primary stage each trainee carries out projects in all types of machines except the tabulator (accounting machine).

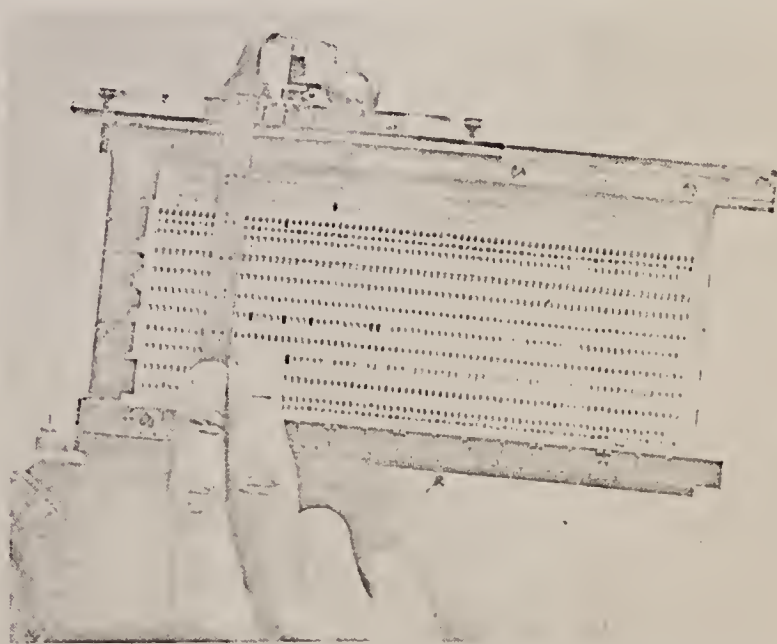
In the second stage the trainees are given more complicated projects, in which they have not only to operate the machines but also wire the control panels. Only in the third stage do they begin to carry out actual projects from installations and offices, with the exception of card-punching.

We are now trying to teach punching to a boy who had suffered from cerebral palsy and is paralyzed in both legs. It is too soon to be sure yet, but if he progresses as he has done so far, it can be anticipated that he will reach standard speed and will find a regular job. Success in this case will mean hope that others who suffer from the same condition can be trained as punch card machine operators.

In conclusion, we now feel certain that well trained blind persons can perform as effectively in the operation of IBM machines as sighted people can and that this field of work offers important new employment opportunities for men and women with visual handicaps.



With braille scale matched to columns of card, blind person can insert needle and check punched cards speedily.



With this device, blind operator reads IBM punch card by touch. (See explanation in accompanying article.)

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